CLAIMS

What is claimed is:

1. A liquid composition comprising

a colloidal suspension of a biomolecule-binding matrix material dispersed in a liquid, wherein particles of said matrix material in said colloidal suspension are of a defined particle size; and

replicate copies of a biomolecule, wherein said biomolecules are distributed throughout said colloidal suspension and are bound to said matrix material particles.

2. The liquid composition of claim 1, wherein said biomolecule-binding matrix material is nitrocellulose, polyvinyl difluoride or activated nylon.

3. The liquid composition of claim 1, wherein said biomolecule is a biopolymer.

4. The liquid composition of claim 1, wherein said biomolecule is a nucleic acid or oligonucleotide.

5. The liquid composition of claim 1, wherein said biomolecule is a protein or oligopeptide.

6. The liquid composition of claim 1, wherein said biomolecules are uniformly distributed throughout said colloidal suspension.

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7. The liquid composition of claim 1, wherein more than one species of biomolecule is distributed throughout said colloidal suspension and bound to said matrix material particles.

8. The liquid composition of claim 7, wherein said more than one species of biomolecule comprise two or more different biomolecule probes.

9. The liquid composition of claim 1, wherein said more than one species of biomolecule comprise one or more biomolecule probes and a blocking biomolecule, wherein said blocking biomolecule blocks sites on said biomolecule-binding matrix material not occupied by said one or more biomolecule probes.

10. The liquid composition of claim 1, wherein said binding of said biomolecules is covalent binding.

11. The liquid composition of claim 1, wherein said binding of said biomolecules is non-covalent binding.

12. The liquid composition of claim 1, wherein said binding of said biomolecules is electrostatic binding.

13. The liquid composition of claim 1, wherein said binding of said biomolecules is adsorption onto a surface of said matrix material particles.

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14. The liquid composition of claim 1, wherein a first reference dye is distributed throughout said colloidal suspension and wherein the concentration of said first reference dye has a known quantitative relationship with the concentration of said biomolecule-binding matrix material.

15. The liquid composition of claim 1, wherein a second reference dye is distributed throughout said colloidal suspension and wherein the concentration of said second reference dye has a known quantitative relationship with said biomolecule.

16. A liquid composition comprising

a colloidal suspension of a biomolecule-binding matrix material dispersed in a liquid, wherein particles of said matrix material in said colloidal suspension are of a defined particle size.

17. The liquid composition of claim 16, wherein said biomolecule-binding matrix material is nitrocellulose, polyvinyl difluoride or activated nylon.

18. The liquid composition of claim 16, wherein a reference dye is distributed throughout said colloidal suspension and wherein the concentration of said reference dye has a known quantitative relationship with

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the concentration of said biomolecule-binding matrix material.

19. The liquid composition of claim 16, wherein said particles of matrix material have a diameter of less than 1 μm.

20. The liquid composition of claim 16, wherein said particles of matrix material have a diameter of less than 0.5 μm.

21. The liquid composition of claim 16, wherein said particles of matrix material have a diameter of less than 0.25 μm.

22. A microporous matrix system for analysis or preparation of biomolecules, said system comprising

a solid support; and

an aliquot of the liquid composition of claim 1 deposited on said support.

23. The microporous matrix system of claim 22, wherein said solid support is planar.

24. The microporous matrix system of claim 22, wherein said solid support is a flexible tape.

25. The microporous matrix system of claim 23, wherein said solid support is a glass slide.

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26. The microporous matrix system of claim 22, wherein multiple aliquots of said liquid composition are deposited on said support.

27. The microporous matrix system of claim 26, wherein said multiple aliquots are deposited on said support in discrete spots.

28. The microporous matrix system of claim 22, wherein said solid support is in the form of microbeads.

29. The microporous matrix system of claim 22, wherein said solid support is a separation column having an inside surface and said aliquot of said liquid composition is deposited on said inside surface.

30. A powder of microfine particles, said powder comprising an aliquot of the liquid composition of claim 1 or claim 16 from which liquid has been removed.

31. The powder of claim 30, wherein said particles have a diameter of less than 10 μm.

32. The powder of claim 30, wherein said particles have a diameter of between 100 and 500 nm.

33. A microarray having a multiplicity of spots, wherein the composition of each of said spots comprises a

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biomolecule-binding matrix material, a first biomolecule bound to said matrix material and a second biomolecule bound to said matrix material, wherein the concentration of said matrix material and the concentration of said first biomolecule varies among the said spots.

34. The microarray of claim 33, wherein said first and second biomolecules are biomolecule probes.

35. The microarray of claim 33, wherein said first biomolecule is a biomolecule probe and said second biomolecule is a blocking biomolecule, wherein said blocking biomolecule blocks sites on said biomolecule-binding matrix material not occupied by said biomolecule probe.

36. The microarray of claim 33, further comprising in at least one spot a first reference dye, wherein the concentration of said first reference dye has a defined quantitative relationship to the concentration of said biomolecule-binding matrix material.

37. The microarray of claim 33, further comprising in at least one spot a second reference dye, wherein the concentration of said second reference dye has a defined quantitative relationship to the concentration of said first biomolecule.

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38. A microarray having a multiplicity of spots, said microarray characterized in that the composition of each spot comprises:

a biomolecule-binding matrix material;

a first biomolecule bound to said matrix material; and

a second biomolecule bound to said matrix material, wherein said relative concentrations of said matrix material and said first biomolecule may vary among said multiplicity of said spots and wherein the quantity of said biomolecule-binding matrix material present in each spot is determined independently from spot to spot throughout said multiplicity of spots.

39. A microarray on a solid support surface, said microarray having a multiplicity of spots, said microarray characterized in that the composition of each spot comprises:

a biomolecule-binding matrix material; and

a first biomolecule bound to said matrix material, wherein the thickness of each of said spots is less than 10 μm.

40. The microarray of claim 39, wherein the thickness of each of said spots is less than 5 μm, less than 2.5 μm or less than 1 μm.

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41. A microarray on a solid support surface, said microarray having a multiplicity of spots, said microarray characterized in that:

the composition of each of said multiplicity of spots comprises a biomolecule-binding matrix material and a biomolecule bound to said matrix material;

each of said multiplicity of spots is greater than or equal to 150 μm in diameter; and

the volume of each of said multiplicity of spots is less than 100 nl.

42. The microarray of claim 41, wherein the volume of each of said spots is less than 50 nl or less than 20 nl.

43. A method for detecting a biomolecule analyte in a liquid sample, said method comprising the steps of:

providing the microarray of claim 33, said spots in said microarray comprising a biomolecule probe capable of binding with said biomolecule analyte;

contacting said microarray with said liquid sample and incubating said liquid sample with said microarray to permit binding of said biomolecule analyte with said biomolecule probe;

removing any unbound portion of said liquid sample from said microarray;

contacting said microarray with developing reagent, said developing reagent comprising optically detectable molecules, said optically detectable molecules reacing with and binding to selected individual spots, said reacting and binding of said optically detectable

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molecules to said spots being dependent on the presence of said biomolecule analyte in said liquid sample;

removing said developing reagent from said microarray following said reaction and binding of said optically detectable molecules; and

analyzing said microarray for optical detection of said optically detectable molecule to determine the presence of said biomolecule analyte in said liquid sample.

44. A method for determining the presence of a drug candidate molecule in a liquid sample, wherein said drug candidate molecule is capable of interacting with a biomolecule probe, said method comprising the steps of;

providing the microarray of claim 33, said spots in said microarray comprising said biomolecule probe capable of interacting with said drug candidate molecule;

contacting said microarray with said liquid sample and incubating said liquid sample with said microarray to permit said interaction of said drug candidate molecule with said biomolecule probe;

removing any unbound portion of said liquid sample from said microarray;

contacting said microarray with developing reagent, said developing reagent comprising optically detectable molecules, said optically detectable molecules reacting with and binding to selected individual spots, said reacting and binding of said optically detectable

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molecules to said spots being dependent on the presence of said drug candidate molecule in said liquid sample;

removing said developing reagent from said microarray following said reaction and binding of said optically detectable molecules; and

analyzing said microarray for optical detection of said optically detectable molecules to determine the presence of said drug candidate molecule in said liquid sample.

45. A drug molecule capable of interacting with a disease-related biomolecule in a mammal and thereby providing prophylactic or therapeutic benefits to a mammal to which the drug is administered, said drug molecule shown to interact with said disease-related biomolecule by a method comprising the steps of:

providing the microarray of claim 33, said spots in said microarray comprising said disease-related biomolecule as a probe;

contacting said microarray with liquid sample and incubating said liquid sample with said microarray to permit interaction of a candidate drug molecule with said biomolecule probe;

removing any unbound portion of said liquid sample from said microarray;

contacting said microarray with developing reagent, said developing reagent comprising optically detectable molecules, said optically detectable molecules reacting with and binding to selected individual spots, said

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reacting and binding of said optically detectable molecules to said spots being dependent on the interaction of said candidate drug molecule with said disease-related biomolecule;

removing said developing reagent from said microarray following said reaction and binding of said optically detectable molecules; and

analyzing said microarray for optical detection of said optically detectable molecule to confirm the capability of said candidate drug to interact with said disease-related biomolecule probe.

46. A method for determining the presence of a particular nucleic acid sequence within a liquid sample of nucleic acids, said method comprising the steps of:

providing the microarray of claim 33, said spots in said microarray comprising a nucleic acid probe capable of hybridizing with said particular nucleic acid sequence, wherein said particular nucleic acid sequence comprises a portion complementary to said nucleic acid probe;

contacting said microarray with said liquid sample and incubating said liquid sample with said microarray to permit said hybridization of said particular nucleic acid sequence with said nucleic acid probe;

removing any unhybridized portion of said liquid sample from said microarray; and

analyzing said microarray for optical detection of said nucleic acid sequences bound to said nucleic acid

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probe of the microarray spot to determine the presence of said particular nucleic acid sequence in said liquid sample.

47. A kit for detecting a biomolecule analyte in a liquid sample, said kit comprising:

the microarray of claim 33; and

reagents and instructions for practicing the method of claim 43.

48. A kit for determining the presence of a drug candidate molecule in a liquid sample, said kit comprising:

the microarray of claim 33; and

reagents and instructions for practicing the method of claim 44.

49. A kit for determining the presence of a particular nucleic acid sequence within a liquid sample of nucleic acids, said kit comprising:

the microarray of claim 33; and

reagents and instructions for practicing the method of claim 46.

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